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GEORGIA INSTITUTE OF TECHNOLOGY
Engineering Experiment Station

PROJECT INITIATION

Date: April 30, 1974

Project Title: "Air Quality Evaluation in Baggage Transfer Facility"

Project No.: A-1627

Project Director: Mr. Fred Dixon

Sponsor: Eastern Air Lines, Inc., Miami, Florida

Effective March 28, 1974 Estimated to run until September 27, 1974

Type Agreement: Standard Industrial Agreement Amount: $ 1,800

Reports Required: Final Technical

Sponsor Contact Person (s): Mr. R. R. Friis
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PROJECT TERMINATION

Date Nov. 26, 1974

PROJECT TITLE: Air Quality Evaluation in Baggage Facility

PROJECT NO: A-1627

PROJECT DIRECTOR: Fred Dixon

SPONSOR: Eastern Air Lines, Inc.

TERMINATION EFFECTIVE: Sept. 27, 1974

CHARGES SHOULD CLEAR ACCOUNTING BY: Sept. 30, 1974

CLOSEOUT ITEMS REMAINING: None

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A-1627

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

FINAL REPORT

on

GEORGIA TECH RESEARCH PROJECT A-1627

"AIR QUALITY EVALUATION IN BAGGAGE TRANSFER FACILITY"

by

F. Dixon and J. D. Lupton

11 October 1974

For

EASTERN AIR LINES

(Project No. ATL-73-14)

ABSTRACT

Carbon monoxide concentrations were monitored at key locations in the Eastern baggage transfer facility on five different days during a three-week period in August. The 1-hour average concentrations ranged from less than 10 ppm to a maximum of 63 ppm. The 8-hour average concentrations ranged from less than 16 ppm to a maximum of 48 ppm. These results meet the OSHA air quality criteria of 150 ppm for 1 hour and 50 ppm for 8 hours, respectively.

Localized remedial measures appear to be available for further control of CO concentrations in the worker areas should future developments so dictate. It is therefore concluded that the building ventilation system is adequate for the present type of operation.

Final Report on Georgia Tech Research Project A-1627
"AIR QUALITY EVALUATION IN BAGGAGE TRANSFER FACILITY"

1. Introduction

The studies documented herein were undertaken for the purpose of completing Item (4) of the "Interim Plan of Action" recommended to Eastern Air Lines in the Summary Report dated 27 September 1973 on previous Georgia Tech Research Project No. A-1566.

Initial recordings of carbon monoxide (CO) concentration within the newly activated baggage transfer facility had been made on December 1-3, 1973, and indicated that OSHA criteria for CO were being met at that time. The present project was established to cover follow-on tests after the facility's operating procedures and traffic levels became fully stabilized and warmer weather conditions prevailed. These tests were conducted on August 7-8, 15, and 19-20, 1974.

2. Procedure

CO concentrations were recorded from a Wilks Scientific Corp. "Miran-I" infrared-type ambient gas analyzer, using Matheson "zero air" and 50 ppm CO in nitrogen as calibration standards. The instrument was mounted on a cart and stationed at various locations inside the belt system, as indicated in Figure 1, to avoid interfering with the baggage handling activities. An 8-foot long intake hose was extended over the belt so as monitor air representative of that being breathed by workers transferring bags to and from carts parked along the outside of the system.

3. Results

Average CO concentrations ran higher during the daytime hours than during the nighttime hours, consistent with the normal distribution of baggage transfer activities. Table I shows the range of highest daily levels encountered among the sites and dates tested.

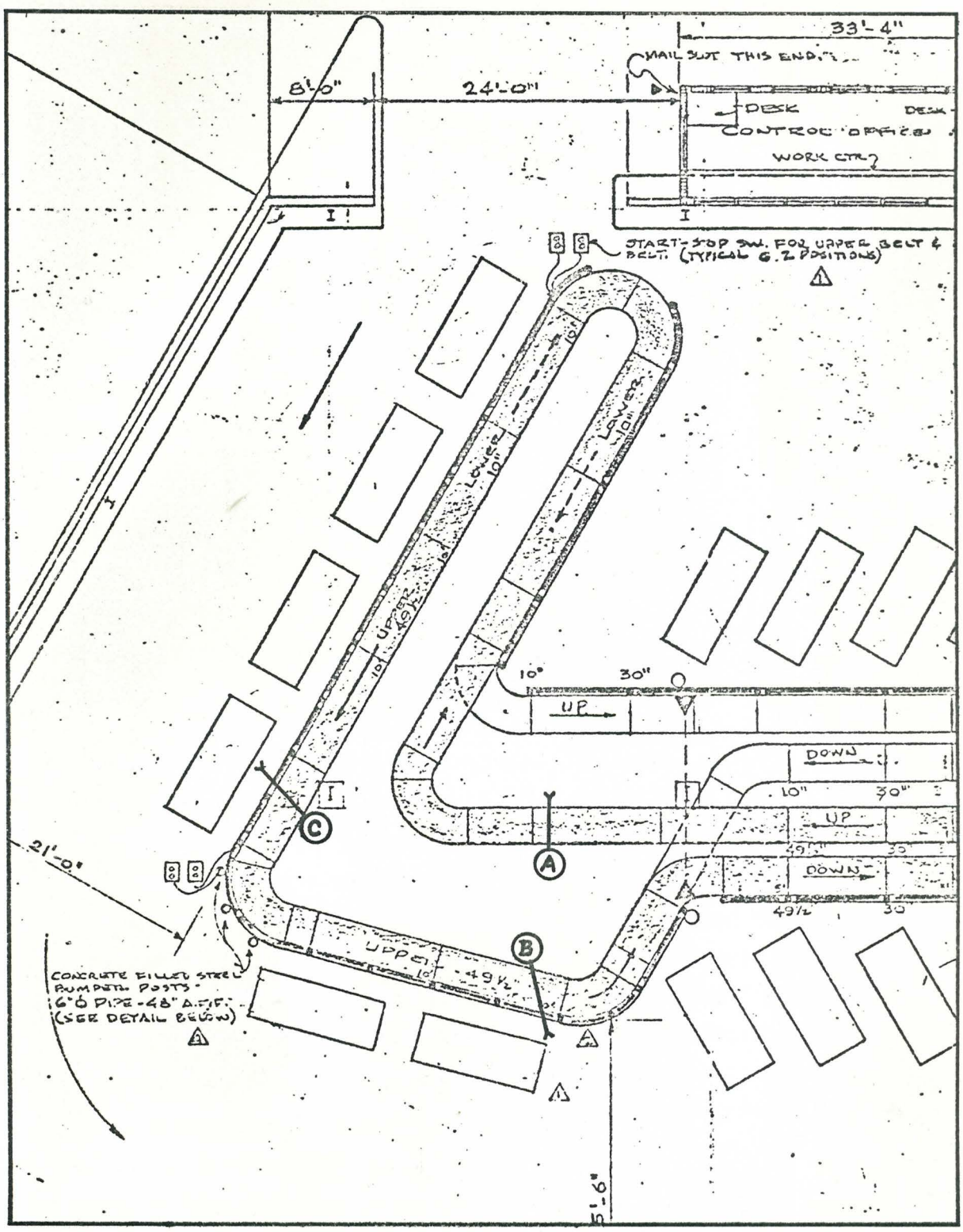

Figure 1. Location of Test Stations (A,B,C) for CO Monitoring Equipment in Key Areas of Baggage Transfer Facility.

TABLE I: Range of Average CO Concentrations Measured During Periods of Highest Level at Test Stations A and C.

TIME OF DAY (At Middle of Averaging Period Noted)	1-HOUR AVERAGE CO CONCENTRATION		8-HOUR AVERAGE CO CONCENTRATION	
	Station A 8/8/74 (ppm)	Station C 8/20/74 (ppm)	Station A 8/8/74 (ppm)	Station C 8/20/74 (ppm)
1000	25	47		
1100	19	47		
1200	27	53		
1300	20	26	18	48
1400	20	40	17	48
1500	16	63	17	47
1600	10	56	17	47
1700	10	50	16	-
1800	16	52		
1900	13	36		
2000	30	52		
2100	14	-		

Recorded levels from Station B (and spot readings made elsewhere) were intermediate in magnitude to those from Stations A and C--with 1-hour averages varying typically between 20 and 40 ppm.

Routine calibration checks on the CO analyzer were made periodically during the daytime hours by introducing "zero" and 50-ppm standard gases, as previously noted. In addition, the recorder pen controls were adjusted occasionally to compensate for systematic baseline drift with temperature. Overnight, however, the instrument was allowed to run unattended, since the fact that nighttime average CO levels were consistently lower than daytime average levels could be determined by simple inspection of the chart recordings--without the effort required for precise calibration and quantitative analysis of the recorded data. Thus, the lowest averages during the night fell below the minimum values seen in Table I but to a somewhat unknown degree.

To summarize the overall test results, therefore, we may state that observed 1-hour average CO concentrations in the baggage transfer facility ranged from less than 10 ppm to a maximum of 63 ppm. Similarly, observed 8-hour average CO concentrations ranged from less than 16 ppm to a maximum of 48 ppm.

The current OSHA limits on exposure of workers to carbon monoxide in the air are 50 ppm average concentration over an 8-hour period and no more than 150 ppm average for any 1-hour interval. Hence, air quality within the Eastern baggage transfer facility was found to meet OSHA standards.

4. Discussion

The rather high 8-hour average CO levels observed at Test Station C (and elsewhere along the truck-unloading portion of the belt system) are, of course, due to the fact that the tractor units ("tugs") have to stand with their engines idling for comparatively long periods in this area of the baggage transfer facility. Their stops at the many loading positions around the belt system are briefer and more dispersed, and accordingly result in lower average CO levels at such other points.

The readings obtained from Test Station A are probably representative of air quality in the baggage transfer facility as a whole, since the CO analyzer at that location was more or less midway between the entrance door and the row of ceiling exhaust fans along the back of the building. Depending on the number of tugs standing in line near the entrance, and on the condition of the ramp air being drawn into the doorway, the 1-hour CO levels at Station A can evidently be expected to vary between about 10 and 30 ppm. Inasmuch as the 8-hour average at Station A was not observed to exceed 18 ppm, it seems reasonable to conclude that the existing building ventilation system is adequate for the present type of operation in the baggage transfer facility.

Should future developments make it necessary to further control CO levels (particularly in the unloading area), the following specific suggestions might be given consideration:

(a) Increase general circulation and mixing of building air by arranging for continuous (independent) operation of existing blower fans in the several heater units mounted on support posts along the center of the ceiling.

(b) Increase localized mixing of air at "low-quality" floor locations by installing additional post-mounted fans of appropriate size and orientation.

(c) Establish operating rules to curtail excessive idling time on the part of tugs. (For example, request engine turn-off if tug is expected to remain stationary for more than one or two minutes.)

(d) Limit time spent by individual workers at high-CO locations. (If feasible, arrange for interchanging of assignments on successive days or successive periods within the same shift.)

In the way of preventive medicine, it is recommended that all of the present ceiling exhaust fans in the baggage transfer building be maintained in good operating condition, even though it may not be found necessary to run all of them continuously. Vigilance should also be exercised to avoid deterioration of the current situation through improperly directed aircraft engine exhausts from parking or pull-out procedures conducted in the immediate vicinity of the baggage transfer facility.

5. Conclusions

(1) The Eastern baggage transfer facility meets current OSHA standards for control of carbon monoxide in the air.

(2) The present building ventilation system, complemented by localized mixing fans, appears capable of accommodating any foreseeable development with the current type of operation.